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NCSP Technical Program Review Pantex Plant March 27-28, 2019

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# Agenda

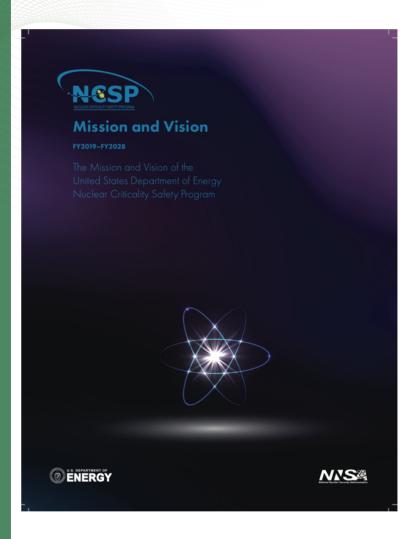
- NCSP T&E Mission and Vision
- Course objectives and offerings
- Two-week hands-on course update
- One-week hands-on course update
- Plans for a new CSO course
- Course statistics



\*OAK RIDGE
National Laboratory



# US DOE Nuclear Criticality Safety Program (NCSP) T&E Course Mission & Vision



### **T&E Course Mission**

- The T&E program element will continue to identify, develop, and facilitate training needs and educational resources, including hands-on training with fissionable material systems, in areas where no suitable alternative exists
- Primary purpose: to maintain and enhance the technical abilities and knowledge of those who impact or are impacted directly by the practice of criticality safety
  - This includes training and education of people entering the criticality safety discipline from related scientific fields, as well as maintaining and enhancing competency levels of those already in the community

### **T&E** Course Vision

 This NCSP element will identify, develop, provide, and promote practical and excellent technical training and educational resources that help ensure competency in the art, science and implementation of nuclear criticality safety and is adaptable and responsive to the needs of those responsible for developing, implementing, and maintaining criticality safety.





## T&E General Course Objectives

- Provide a consistent level of DOE interpretation, understanding, awareness and applications regarding
  - DOE Orders, Guides, ANS Standards, Rules
  - Performance of Criticality Safety Evaluations
  - Hazards Analysis Methods and Implementation/maintenance of NCS Controls including precision and uncertainty of NDA and DA requirements
- Ensure versatility for cleared and uncleared students
- Provide alternate/backup facility capabilities for hands-on training
- Provide experimental hands-on training addressing
  - Characteristics of Neutron Multiplying Systems
  - Discussion of
    - Reactor dynamics
    - Implications for the Safety of Fissionable Material Operations



#### UNITED STATES DEPARTMENT OF ENERGY NUCLEAR CRITICALITY SAFETY PROGRAM TRAINING & EDUCATION PROGRAM

**COURSE PROCEDURE** 







### Sign J.

CSSG Response to Tasking 2009-03

Recommendations for the Future DOE NCSP Training and Education Infrastructure Program

October 16, 2009

#### Introduction

The Criticality Safety Support Group (CSSG) was directed in Tasking 2009-03 (see Attachment 1) to provide a position paper regarding the establishment of an integrated DOE Nuclear Criticality Safety Program (NCSP) Training and Education Infrastructure Program that is consistent with the mission and vision of the DOE NCSF. The objective is to assess and recommend DOE NCSP-funded and-imanaged training options that address all requirements of ANSI/ANS-8.26-2007 excluding those which are not appropriate for inclusion in the DOE NCSP Training Infrastructure (e.g., academic training, site-specific training).

A subgroup of the CSSG was formed to draft the position paper, which was then submitted to the entire CSSG for review and comment.

#### Consideration of ANSI/ANS-8.26-2007 Content

The review team examined the content of ANSI/ANS-8.26-2007, with particular focus on determining which NCS staff training objectives should be addressed by DOE training and education efforts.

The selected training objectives were prioritized to reflect where DOE NCSP involvement should focus, considering schedule drivers (e.g., impending deinventory of LLNL for security category! I materials), existing availability of training resources, and potential for improvement of DOE contractor NCS program performance. These priorities resulted:

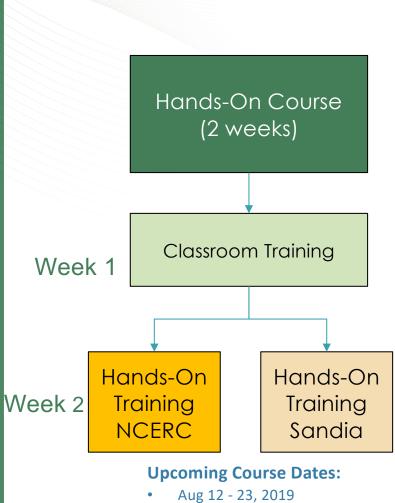
Top Priority: Provide a hands-on training experience addressing important characteristics of neutron multiplying systems, along with discussion of the theory and implications for safety of fissionable material operations. Since there are critically safety engineer positions within the DOE complex that do not require DOE security clearances, and new hires may have an extended waiting period before clearance is granted, it is essential that this hands-on training be available to uncleared individuals.

<u>Basis</u>: The requirement for this type of experience cannot readily be met through DOE contractors' individual actions and resources, thus DOE needs to assist in this area.

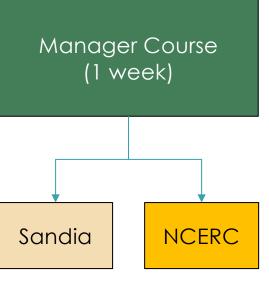




## NCSP T&E Course Offerings

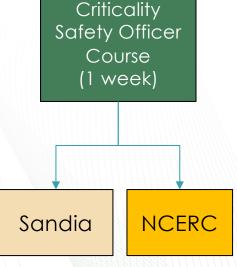


**NCSP Training and Education Courses** 



# Special Courses (1 week) **NCERC** Last course held in 2015 for **AWE**

**Development** begins in mid-FY19 based on **CSSG** tasking report 2018-1



#### **Upcoming Course Dates:**

- Apr 8 12, 2019
- Jun 3 7, 2019

- Jan 27 Feb 7, 2020

- National Criticality Experiments Research Center (NCERC)
- Nevada Field Office (NFO)
- National Atomic Testing Museum (NATM)





# Two-week hands-on course: Week 1 – classroom portion

- DOE requirements, national standards, and DOE NCSP
- Processing criticality accident lessons-learned
- NCS fundamentals
- ANSI/ANS-8 consensus standards
- Single unit and array hand calculation methods
- NCSE workshops
- Human factors and reliability principles for NCS evaluations
- Nondestructive assay (NDA) interpretation and application of NDA methods and results to NCSEs
- Validation of computational methods
- Daily homework and quizzes
- Passing requirement: overall grade of 80%







### Two-week hands-on course: Week 2, hands-on portion

- Overview of Sandia and NCERC facilities and assemblies
- Overview of the experiment procedures and methodology
- Neutron dynamics fundamentals and subcritical multiplication
- Nuclear instrumentation
- ANSI/ANS-1 Conduct of Critical Experiments
- Lessons learned from experimental criticality accidents
- Subcritical and critical experiments
  - NCERC operations with Planet, Flattop, Godiva IV, BeRP Ball, <sup>237</sup>Np Sphere, and Training Assembly for Criticality Safety (TACS)
  - Sandia Seven percent critical experiment (7uPCX), Annular
     Core Research Reactor Core (ACRR) burst
- Critical experiments and the International Criticality Safety Benchmark Evaluation Project (ICSBEP) handbook
- Passing requirement: overall grade of 80%





### One-week manager course

Focus: understanding the student's role in an NCS program

- DOE requirements, national standards, and the DOE NCSP
- Overview of Sandia and NCERC facilities, assemblies, and experiment procedures and methodology
- Neutron dynamics fundamentals and subcritical multiplication
- Nuclear instrumentation; conduct of operations
- ANSI/ANS-1 & 8 consensus standards
- NCSEs
- Lessons learned from criticality accidents
- Subcritical and critical experiments
  - NCERC Ops with Planet, Flattop, Godiva IV, BeRP Ball, <sup>237</sup>Np Sphere, and Training Assembly for Criticality Safety (TACS)
  - Sandia Seven percent critical experiment (7uPCX), Annular Core Research Reactor Core (ACRR) burst
- Passing requirement: overall grade of 80%







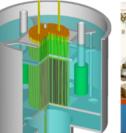












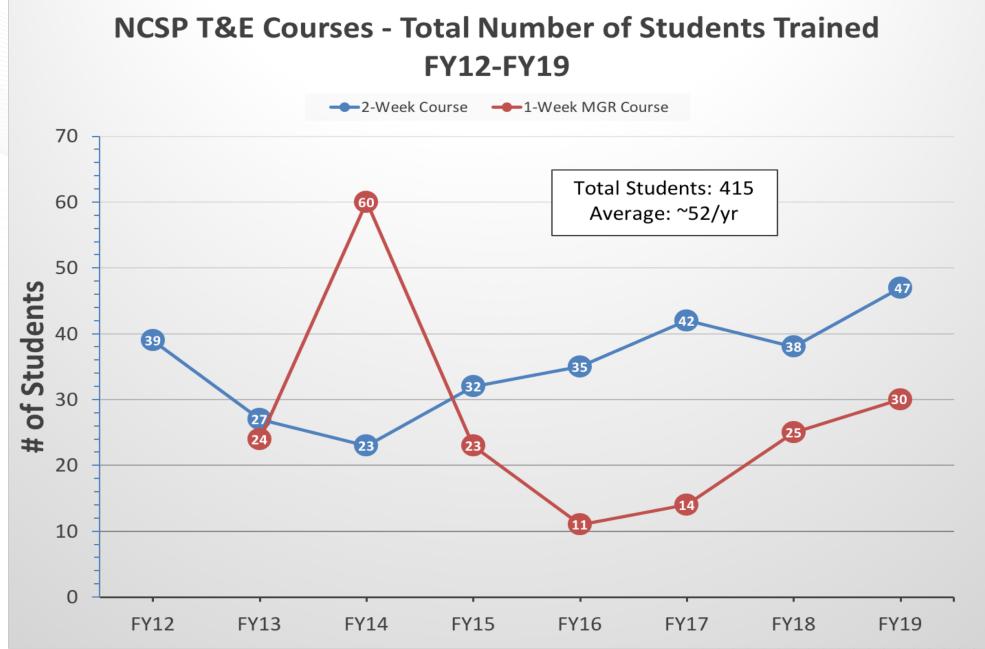




# Course Statistics







FY2019 Data is based on current registration data





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#### Sandia

**National Atomic Testing Museum** 

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### In addition:

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Questions?





